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ETIENNE HARLÉ, OF ROUEN, FRANCE.

EXPLOSIVE AND PROCESS FOR ITS MANUFACTURE.

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To all whom it may concern:

Be it known that I, ETIENNE HARLÉ, residing at 1 Rue d'Harcourt, Rouen, Seine-Inferieure, France, have invented certain new and useful Improvements in Explosives and Processes for Their Manufacture, of which the following is a specification.

It is known that mixing mercury fulminate with fatty matters (oils, greases, paraffins, etc.,) renders the mercury fulminate less sensitive to shock. Thus the detonating fuse employed by the Austrian army comprises a core or mercury fulminate containing a high proportion of paraffin.

When however as is usual the mercury fulminate is mixed with high proportion of fatty matters, it is insensitized to such a degree that a detonator of pure fulminate is required to detonate it.

The fulminate if it is to preserve its priming action can only be mixed with a much smaller quantiy of fatty matters. Hitherto the proportion of fatty matters mixed with the fulminate has been far larger than is sufficient to render it insensitive owing to which insensitized fulminate detonators have been used to the best advantage.

It has now been discovered that mercury fulminate is insensitized with a far smaller quantity of fatty matters than has hitherto been employed. Thus detonators charged in the ordinary manner with 1.2 grams of trinitrotoluene or with picric acid or with tetryl may leave a very large quantity of unexploded material if detonated with 0.42 gram mercury fulminate containing even 0.05% of its weight in oil. But if the fulminate is not mixed with oil such quantity of fulminate is sufficient in all cases to cause complete detonation and this quantity of pure fulminate has usually been employed in practice.

According to this invention an insensitized explosive still retaining its full priming power is produced by mixing lead azide with a much larger quantity of fatty matters (oils, greases, paraffins, etc.). The quantity of fatty matters which it is possible to incorporate with it would with certainty render mercury fulminate insensitive: the quantity added may exceed 300 times that which suffices to insensitized mercury fulminate. Thus lead azide may be mixed with up to 14% of its weight of oils, greases or paraffins without its priming properties being substantially modified and without it being necessary to employ a quantity of fatty azide greater than the weight of pure normal fulminate to cause complete detonation.

Detonators charged with 1.2 grams of trinitrotoluene and primed with 0.33 gram only of lead azide and containing 12% paraffin never fail.

The quantity of fatty azide to be added varies with the proportion of fatty matters incorporated. The table set out below by way of illustration shows the quantities of fatty azide that experiment has shown to be necessary practically to obtain the same effect as with the detonators charged with 0.42 gram of pure fulminate:

0.33 gram fatty azide containing 12% paraffin.

0.65 gram fatty azide containing 15% paraffin.

0.90 gram fatty azide containing 20% paraffin.

These quantities of azide correspond to a compound detonator whose lower charge is trinitrotoluene (T. N. T.). If tetryl (English and German detonators) which is much more sensitive be employed in a compound charge, the quantities of azide may evidently be smaller. Thus detonators charged with tetryl require in practice only a single charge of 0.15 gram azide admixed with 12% of paraffin provided a top cap is employed.

As will be seen, the quantity of azide varies with the quantity of paraffin added and with the sensitiveness of the mixed charge. But with fulminate containing a like proportion of fatty matters there will always be misfires.

Paraffin for example may be admixed

in a very simple manner either directly and with heat or by employing a known solvent of paraffin which is then evaporated.

Lead azide insensitized by means of paraffin allows fatted lead azide to be obtained in the form of small grains. The small grains are obtained in any suitable manner, for example by those which have been employed for granulating black powder. The advantages obtained by the employment of such high proportion of fatty matters and which form the object of the present invention are:

1. An easier and less dangerous manipulation of the azide, dust is completely prevented by this coating.

2. The introduction of large quantities of solid paraffin or other grease allows explosive grains of the size desired easily to be obtained by the use of sieves. If charging hoppers now in use are employed very regular charges of the substance can be obtained.

3. The azide so coated is, if the quantity of fatty bodies be sufficient, quite insensitive to the action of water.

Detonators whose layer of azide contains 10 to 12% of paraffin may be filled with water without in any way losing their explosive properties after the water they contain has been poured off. The layer of fatty azide, being unwettable and impermeable to water, protects the layer of compressed trinitrotoluene or of tetryl below it at the bottom of the detonator from the action of the water.

4. As water has no action on detonators thus constituted, the carbonic acid of the atmosphere has also no action and one of the main defects in the use of lead azide is that it is attacked by carbonic acid which is often encountered in certain mines; to this cause several inexplicable accidents have been attributed which occurred when detonators containing lead azide were first used. Detonators whose lead azide contains a high proportion of paraffin for example, are thus very effectively protected against the action of carbonic acid and the humidity of the atmosphere.

5. Coating the azide with a fatty body also has for effect that the nitride has no action upon metals. It is known that so far as possible azide should be charged in tubes other than the usual copper tubes; special precautions at least should be taken. It is known that the carbonic acid of the atmosphere in the presence of water decomposes lead azide, the hydrazoic acid set free attacking the copper. It is even probable that in the presence of traces of humidity there may be a reaction between lead azide and the metal (copper or zinc) and the formation of certain salts which may be very dangerous. Similar reactions need not be feared with the lead azide coated with a fatty body as above described.

6. The introduction of these high proportions of paraffin for example (which in no way diminishes the priming properities of the single azide) allows other bodies to be mixed with it such as those employed in the manufacture of percussion caps for sporting or war cartridges. The mixture which is intimately bound by the paraffin, remains homogeneous whatever may be the shock or manipulations to which it may be subjected.

7. Finally the high proportions of fatty matters which may also be introduced into lead azide without practically weakening its priming properties renders it more easily manipulable by diminishing its sensitiveness to shock. Azide containing 14% of paraffin is infinitely less sensitive to shock than mercury fulminate.

Claims:

1. Process for obtaining a desensitized priming body which retains its priming properties which consists in mixing lead azide with a proportion of fatty matters greater than the minimum proportion which added to mercury fulminate would so insensitize the fulminate as so to reduce its priming power that it would cause misfires.

2. Process for obtaining a desensitized priming body which retains its priming properties, which consists in incorporating with lead azide by mixture, a proportion of fatty matters greater than 0.05% and less than 20%.

3. Process for obtaining a desensitized priming body which retains its priming properties, which consists in incorporating with lead azide a proportion of about 14% of fatty matters.

4. Process for obtaining a desensitized priming body which retains its priming properties and is suitable for being easily charged into detonators, which consists in incorporating with lead azide a proportion of solid fatty matters sufficient to granulate the mass obtained.

5. Process for obtaining a desensitized priming body which retains its priming properties and is suitable for being easily charged into detonators, which consists in incorporating with lead azide a proportion of about 14% of paraffin and in granulating the mass obtained.

6. A desensitized priming substance possessing a priming power substantially similar to that of lead azide, which contains a mixture of lead azide and fatty matters in the proportion of 0.05% to 20% with respect to the lead azide.

7. A desensitized priming substance possessing priming power practically similar to that of lead azide, which contains a mixture of lead azide and fatty matters in a

proportion of about 14% with respect to the lead azide.

8. A desensitized priming substance possessing priming power practically similar to that of lead azide which contains a mixture of lead azide and about 12 to 14% of paraffin.

9. A detonator having as priming substance lead azide with which is incorporated one or more fatty matters in the proportion of 0.05 to 20%.

In testimony whereof I affix my signature.

ETIENNE HARLÉ.